

### Remarks

Claims 1-28, 30-34, 45-49, and 52-58 are pending. Claims 29, 35-44, 50, 51 and 59-65 are cancelled. Claims 25-28, 30-34, 45-49, and 52-58 are withdrawn as directed to a non-elected invention or species.

### **Election/Restriction**

Applicants have elected, with traverse, claims 1-24 as directed to the species *Thuja plicata* Don., the polar solvent methanol and the nonpolar solvent dichloromethane. Claims 1-17 and 19-24 read on the elected species. Cancellation of the non-elected claims will be reviewed upon notification of allowable subject matter.

### **Rejections Under 35 U.S.C. §103**

Claims 1-5, 8-15, and 19-24 stand rejected based on the assertion that they are *prima facie* obvious over Johansson et al. (Wood Science and Technology 34, 389-401, 2000) as evidenced by Johansson et al. (Holzforschung 54: 246-254, 2000).

Claims 1-24 stand rejected based on the assertion that they are *prima facie* obvious over Johansson et al. (Wood Science and Technology 34, 389-401, 2000) in view of Delong et al. (US4966650), further in view of Naae et al. (US6207808) as evidenced by Johansson et al. (Holzforschung 54: 246-254, 2000).

The Action acknowledges that the primary reference, Johansson et al. (Wood Science and Technology 34, 389-401, 2000), does not teach the claimed extraction period, extracting lignins from *Thuja plicata*, using the nonpolar solvent dichloromethane, or an additional wash using the nonpolar solvent diethyl ether.

The claims have been amended to clarify that the claimed process is a **batch** extraction, which achieves the claimed extraction of **at least 50% of the tropolones** from the batch extraction mixture of plant materials into **the** batch of solvent while **the** batch extraction mixture is maintained under extraction conditions. This aspect of the claimed invention is for example discussed in the context of Examples 1 and 2, and evidenced in Tables 3 and 4. The present

invention accordingly provides a batch process capable of a surprising degree of recovery of a selected constituent, tropolones. As discussed below, the cited art does not teach or suggest that a batch extraction could be used to achieve this result, nor does it suggest any motivation to adapt a batch extraction process to serve this purpose.

As is recognized in the Action, at page 391 of the cited Johansson et al. Wood Science and Technology 34, 389-401 reference, there is a discussion of an extraction protocol that utilizes a methanol solvent in a **Soxhlet** extractor, indicating that:

"pulps were extracted for 20 to 22 hours at a rate of about four siphons per hour.

Extended runs indicated that no additional colour was removed after 20 hours."

Similarly, at page 247, Johansson et al., Holzforschung 54: 246-254, 2000, indicate that:

"Western red cedar extractives were isolated from the wood via soxhlet extraction... Using methanol as the solvent (250 ml), the wood was extracted for seven days at a rate of about 4 siphons per hour; the methanol was refreshed daily."

The foregoing references accordingly disclose a laboratory scale **Soxhlet** extraction. The Soxhlet extraction process is well known in the art, and is for example discussed in US Patent Nos. 4,265,860 and 5776317, which relate to variants of the Soxhlet extractor. In essence, repeated aliquots or "siphons" of the **distilled** solvent are used to sequentially extract soluble components from a solid substrate. In this way, the solid material is exposed to repeated extractions with fresh solvent, in effect utilizing many rounds of extraction with fresh solvent derived by distillation from a pregnant solvent.

In the case of the cited Wood Science article, Soxhlet extractions took place for at least 20 hours at a rate of about four siphons per hour, for an effective total of about 80 sequential extractions with refreshed, heated and distilled, solvent. In the case of the cited Holzforschung article, Soxhlet extractions took place for seven days at a rate of about 4 siphons per hour, for an effective total of about 672 sequential extractions with heating and distilled solvent.

The overall process of Soxhlet extraction is not therefore a batch extraction process wherein ~~the~~ batch extraction mixture of solvent and plant materials is **maintained** under extraction conditions to extract tropolones into ~~the~~ batch of solvent. Rather, it is a sequential series of extractions with refreshed, heated and distilled, solvent, i.e. many effective batches of solvent.

This Soxhlet procedure is to be contrasted with the procedures set out in present Example 1, which is a batch process involving two sequential batches of fresh methanol solvent, followed by extraction from the methanol into the nonpolar solvent dichloromethane to form Extract 1A, which is then heated to obtain Purified Solid Extract 1A. As set out in the paragraph preceding Table 3, Purified Extract 1A was about 6% by weight of the original plant material. As set out in Table 3, that extract was 14-17% by weight identifiable tropolones: beta thujaplicin (4-5%) and gamma thujaplicin (10-12%). The overall extraction of tropolones evidenced by Example 1 is therefore approximately 0.8-1% by weight of the original plant material (14-17% of 6%).

Johansson et al (U, Wood Science and Technology 34, 389-401) teaches that extraction of 1 kg of Oven Dried (OD) heartwood using the Soxhlet method (with approximately 80 effective sequential extraction cycles) yielded 142g of extract. 4% of that 142g is reported to be tropolones (page 398). This means that 5.68g of tropolones per kg of OD heartwood (or 0.568% w/w) are extracted by the Soxhlet method taught by that reference.

Example 1 of the present application accordingly illustrates the surprising result that tropolones constituting 0.8-1% by weight of an original plant material may be obtained in a commercial scale batch extraction process that involves a methanol extraction step followed by partition of the tropolones into a dichloromethane nonpolar solvent. In contrast, the cited Wood Science article teaches that exhaustive extraction by the Soxhlet process yields tropolones constituting only approximately 0.57% of the original plant material.

The surprising efficiency of the commercial scale batch extraction process of the invention is reflected in the claimed recovery of at least 50% of the tropolones in the plant materials into a batch of polar solvent, followed by partitioning of the tropolones **substantially**

into a nonpolar solvent. It is respectfully submitted that there is nothing in the cited art that would provide a basis for a reasonable expectation that one could adjust batch extraction conditions **and** partition conditions to successfully achieve this surprising result.

In addition to failing to provide a basis for any reasonable expectation of success in methods as claimed, the cited art does not suggest any motivation for optimizing a process to recover at least 50% of the tropolones from a plant material. The *Holzforschung* paper in particular explicitly teaches that lignans, rather than tropolones, are responsible for the (undesired) coloration of cedar pulps. The cited art teaches that tropolones are substantially destroyed by the pulping process, in effect teaching that there is no need to develop commercially-relevant techniques for optimal tropolone extraction.

In summary, Applicant respectfully submits that the cited references fail to satisfy the requirements for a finding of obviousness of the claims as amended, in accordance with the requirements of the “Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*” (Federal Register, Vol. 72, No. 195, Oct. 10, 2007, pp. 57526 – 57535) (the “Guidelines”).

**Conclusion**

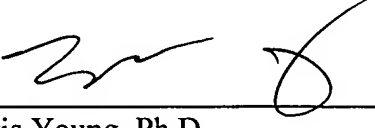
Applicants submit that, in view of the foregoing amendments and remarks, pending claims 1–24 are in condition for allowance. Such action is respectfully requested.

Respectfully submitted,

KLARQUIST SPARKMAN, LLP

One World Trade Center, Suite 1600  
121 S.W. Salmon Street  
Portland, Oregon 97204  
Telephone: (503) 595-5300  
Facsimile: (503) 595-5301

By

  
\_\_\_\_\_  
Travis Young, Ph.D.  
Registration No. 53,819